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(54) METHOD OF FORMING  
SEMICONDUCTOR FILM

(57) Abstract:

**PURPOSE:** To enable polycrystalline Si film growth and epitaxial growth of large mobility at a low temperature, by forming an Si film on a substrate by using thermal decomposition or optical decomposition of specified silane material.

**CONSTITUTION:** An Si film is formed on a substrate by thermally or optically decomposing raw material of

silane ( $\text{SiH}_{2n+2}$ ),  $n = 3$ , like trisilane ( $\text{Si}_3\text{H}_8$ ) and tetrasilane ( $\text{Si}_4\text{H}_{10}$ ). By CVD method, a polycrystalline Si film whose grain diameter is about  $3\mu\text{m}$  can be formed when the temperature of a Pyrex glass substrate is  $400^\circ\text{C}$ . A TFT using an Si film has large electric charge mobility and high speed operation is realized. The similar polycrystal can be obtained by irradiating the surface of the substrate at  $100^\circ\text{C}$  with ultraviolet rays. In order to epitaxially grow a single crystal Si film on a single crystal Si substrate by using  $\text{Si}_3\text{H}_8$  or  $\text{Si}_4\text{H}_{10}$  as raw material, the substrate temperature is set at  $100^\circ\text{C}$ , and ultraviolet rays are projected or plasma is utilized.

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